AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A self-mode locked multi-section semiconductor laser diode, for generating high-frequency optical pulsation and controlling the pulsation frequency, comprising:

a complex-coupled DFB laser section that includes a complex-coupled grating and an active structure for emitting laser light in a longitudinally single mode, where the intensity of oscillating laser light is controlled by means of the current injected to the complex-coupled DFB laser section; and

an external cavity including a phase control section and an amplifier section for controlling the phase and strength of the laser light fed back to the complex-coupled DFB laser section after round-trip through the phase control section and the amplifier section by means of the currents injected into the phase control section and the amplifier section, the phase control section having a guiding layer as a passive waveguide that controls a phase variation of feedback laser light, the amplifier section having an active structure ~~that~~ between two guiding layers having band gaps of an equal length to control ~~controls~~ the strength of the feedback laser light, the DFB laser section and the external cavity being monolithically integrated on a single substrate, current being independently injected into each of the sections, wherein the multi-section semiconductor laser diode outputs high-frequency optical pulsation according to self mode-locking of compound cavity modes, and the phase and strength of the feedback laser light can be adjusted to vary the pulsation frequency in a wide range.

2. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 1, wherein the laser diode has a buried heterostructure.

3. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency, as claimed in claim 1, wherein the laser diode has a ridge structure.

4. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 1, wherein the complex-coupled grating of the DFB laser section is a loss-coupled grating constructed in a manner in which a diffraction grating is formed in an additional absorptive layer, which longitudinally periodically varies both effective refractive index and loss.

5. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 1, wherein the complex-coupled grating of the DFB laser section is a gain-coupled grating constructed in a manner in which a diffraction grating is formed in an active structure, which longitudinally periodically varies both effective refractive index and gain.

6. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 1, wherein each of the active structures included in the DFB laser section and the amplifier section is formed in a manner in which a first light guiding layer, an active layer, and a second light guiding layer are sequentially deposited.

7. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 6, wherein each of the first and second light guiding layers is formed of InGaAsP having a band gap of 1.3μm and has a thickness of 70nm, and the active layer has a multi-quantum-well structure with a band gap of 1.55μm including wells and barriers according to InGaAsP.

8. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 6, wherein each of the first and second light guiding layers is formed of InGaAsP having a band gap of 1.3μm and has a thickness of 70nm, and the active layer is formed of InGaAsP having a band gap of 1.55μm.

9. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 1, wherein the guiding layer of the phase control section is arranged through butt-coupling such that its central axis accords with those of the active structures.

10. (Previously Presented) The self-mode locked multi-section semiconductor laser diode for generating high-frequency optical pulsation and controlling the pulsation frequency as claimed in claim 9, wherein the guiding layer has a thickness of 400nm and is made of InGaAsP having a band gap of 1.3μm.

11. (Original) The self-mode locked multi-section semiconductor laser diode as claimed in claim 1, wherein the DFB laser section, the phase control section, and the amplifier section are constructed through evanescent-coupling in which the sections have a common guiding layer.

12. (Original) The self-mode locked multi-section semiconductor laser diode as claimed in claim 1, wherein the phase control section is located between the DFB laser section and the amplifier section.

13. (Original) The self-mode locked multi-section semiconductor laser diode as claimed in claim 1, wherein the amplifier section is located between the DFB laser section and the phase control section.

14. (Original) The self-mode locked multi-section semiconductor laser diode as claimed in claim 1, wherein the facet of the DFB laser section is coated with an anti-reflection film, whereas the facet of the external cavity, opposite to the facet of the DFB laser region, is coated with a high-reflection film or is left as cleaved.

15. (Cancelled)